# 1998

# HIGH SCHOOL

# MATHEMATICS

# SCORING GUIDES

# SESSION 1

**MISSOURI ASSESSMENT PROGRAM**
**MATHEMATICS SPRING 1998**
**SCORING GUIDE**
**GRADE 10**

1. Students should not be penalized for omitting the following:

   - degree symbols
   - dollar signs ($) or cent signs (¢)
   - zeros for place holders; for example, either 0.75 or .750 could be used
   - labels for word problems; for example, "miles"

2. Students should not be penalized for:

   - spelling or grammar errors
   - using abbreviations; for example, ft or feet could be used
   - adding extra answer(s) as long as the answer(s) are correct and indicated as answer(s); however, if the extra answer(s) are incorrect, one point will be deducted.

3. Students should be given credit for:

   - answers not written on answer line; for example, answer could be given in work space or in explanation

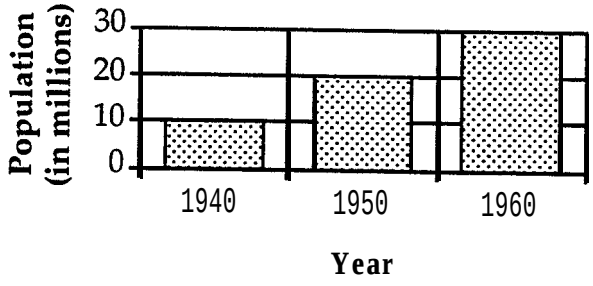
4. Graphs

   - The order in which the data in bar and circle graphs are graphed is NOT important.
   - Line graphs are acceptable with or without lines connecting the points.
   - Any width of a bar in a bar graph is acceptable.
   - Students should be given full credit for graphing extra data point(s) as long as the point(s) are reasonable.
   - Students should not be penalized for compressing the interval between 0 and the first increment as long as the other intervals are consistent.
   - Bar graphs can be horizontal or vertical; however, bars must originate at the axis representing the independent variable. (See attached..)

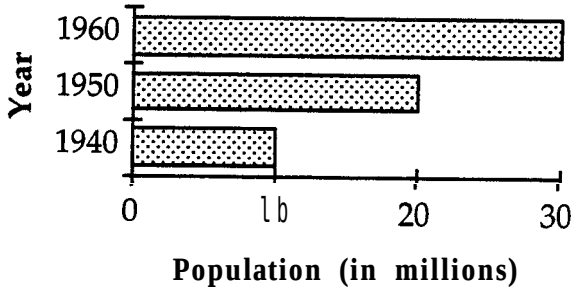
Condition Codes:

A. No response/refusal
B. Insufficient work to score
C. Off task
D: Illegible
E. Predominantly in another language

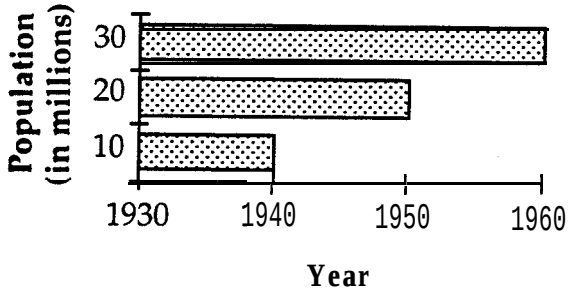
**CORRECT**




**CORRECT**




**INCORRECT**



**Session:** 1
**Item:** 1
**Page:** 2
**Content Standard(s):** 2 Geometric/Spatial Sense and Measurement
**Process Standard(s):** 3.7

**Exemplary Response:**

- 471 (feet) or $150\pi$ (feet) or 465 (feet) when values are rounded

AND

- $3.14(2 \times 30) \times 15 = 2826$
  $3.14(2 \times 25) \times 15 = 2355$
  **2826 − 2355**

  OR

  Other valid process

**Score Points:**

| | |
|---|---|
| **2** points | Exemplary Response |
| 1 point | Correct process; error in computation |
| | OR |
| | Correct answer |
| 0 points | Other |

**Session:** 1
**Item:** 2
**Page:** 3
**Content Standard(s):** 3 Data Analysis, Probability, and Statistics
**Process Standard(s):** 3.7

**Exemplary Response:**

- 17 (maximum rides)

AND

- Finds the total time ($5\frac{1}{2}$ hours or 330 minutes)
  Finds the average time per ride (19 minutes)
  Finds the number of rides

  OR

  Other valid process

**Score Points:**

| | |
|---|---|
| 2 points | Exemplary Response |
| 1 point | Correct process; error in computation<br>OR<br>Correct answer |
| 0 points | Other |

**Scoring Comments:**

If value of 19 is used correctly (330 ÷ 19) but actual average process is not shown, give credit for process.
Guess and check is acceptable for other valid process.
If half hour for lunch is not subtracted, but process is otherwise complete, student earns a process point.

Ex: $\frac{360 \text{ min.}}{19 \text{ min.}} \approx 18$ rides

**Session:** 1
**Item:** 3
**Page:** 4
**Content Standard(s):** 5 Mathematical Systems and Number Theory
**Process Standard(s):** 3.1

**Exemplary Response:**

- 7 (people)

AND

- $6 = 2 \times 3$
  $14 = 2 \times 7$
  $2 \times 3 \times 7 = 42$ (Least Common Multiple)
  $300 \div 42 = 7.14$ or 7

  OR

  6: 0, 6, 12, 18, 24, 30, 36, 42, 48
  14: 0, 14, 28, 42, 56
  42nd, 84th, 126th, 168th, 210th, 252nd, 294th

  OR

  Other valid process

**Score Points:**

| | |
|---|---|
| 2 points | Exemplary Response |
| 1 point | Correct process; error in computation |
| | OR |
| | Correct answer |
| 0 points | Other |

**Scoring Comments:**

Must show a process for finding L.C.M.

**Session:** 1
**Item:** **4**
**Page:** **4**
**Content Standard(s):** **4** Patterns and Relationships
**Process Standard(s):** **1.6**

**Exemplary Response:**

- $F = 2 + 0.5[2(h - 1)]$; (where $h$ = number of hours)

  OR

  $F = 2 + 1(h - 1)$; (where $h$ = number of hours)

  OR

  $F = h + 1$ (where $h$ = number of hours)

  OR

  Other valid equation

AND

- 7.50 (dollars)

AND

- $F = 2 + 0.5[2(6.5 - 1)]$
  $F = 2 + 5.5$

  OR

  Process using other valid equation

**Score Points:**

| | |
|---|---|
| *3* points | Exemplary Response (three components) |
| *2* points | Two components |
| | OR |
| | Appropriate solution and process using incorrect equation |
| 1 point | One component |
| 0 points | Other |

**Session:** 1
**Item:** 5
**Page:** 5
**Content Standard(s):** 6 Discrete Mathematics
**Process Standard(s):** 3.4

**Exemplary Response:**

- 24 (combinations)

AND

- $4 \times 3 \times 2 \times 1 (= 4!)$

OR

| | | | |
|---|---|---|---|
| R, T, S, C | T, R, S, C | S, C, R, T | C, R, S, T |
| R, T, C, S | T, R, C, S | S, C, T, R | C, R, T, S |
| R, C, S, T | T, C, R, S | S, R, T, C | C, S, R, T |
| R, C, T, S | T, C, S, R | S, R, C, T | C, S, T, R |
| R, S, T, C | T, S, C, R | S, T, R, C | C, T, R, S |
| R, S, C, T | T, S, R, C | S, T, C, R | C, T, S, R |

OR

Tree **diagram**

**OR**

Other valid method of finding all of the combinations

**Score Points:**

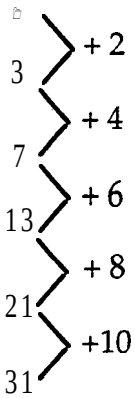
| | |
|---|---|
| **2 points** | Exemplary Response |
| **1 point** | Correct process; error in computation |
| | OR |
| | Correct answer |
| 0 points | Other |

**Session:** 1
**Item:** **6**
**Page:** **6**
**Content Standard(s):** **4** Patterns and Relationships
**Process Standard(s):** **1.6**

**Exemplary Response:**

- 43 (runs for week 7)
  57 (runs for week 8)

AND

- 


  31 + 12 = 43
  43 + 14 = 57

  OR

  Other valid process

  Ex: $w^2 - (w - 1) = \text{runs}$
  $7^2 - 6 = 43$ and $8^2 - 7 = 57$

**Score Points:**

| | |
|---|---|
| 2 points | Exemplary Response (two components) |
| 1 point | One component |
| 0 points | Other |

**Session:** 1
**Item:** **7**
**Page:** **7**
**Content Standard(s):** 5 Mathematical Systems and Number Theory
**Process Standard(s):** **3.1**

**Exemplary Response:**

- **15** (cones)

AND

- Distance without end cone $100 - 1\frac{1}{2} = 98\frac{1}{2}$

  **98;** $\div (1\frac{1}{2} + 6) \approx 13.13$
  13.13 + 1 (end cone) = 14.13 or 15 (cones)

  OR

  **100** $\div 7\frac{1}{2} \approx$ **13.3**
  **13** (cones) $\times 7\frac{1}{2}$ **= 97.5** (feet)
  97.5 + 1.5 (distance for end cone) = 99 (feet)
  14 cones not enough-need 1 more cone

  OR

  **1200** inches $\div$ 90 inches = 13.3
  13 x 90 = 1170 (inches)
  1170 + 18 (distance for end cone) = 1188 (inches)
  1188 < 1200 (inches)
  14 cones not enough-need 1 more cone

  OR

  Other valid process

AND

- $106\frac{1}{2}$ (feet) or 106 feet, 6 inches

  OR

  Correct number of feet based on number of cones indicated

**Session:** 1
**Item:** 7
**Page:** 7
**Content Standard(s):** 5 Mathematical Systems and Number Theory
**Process Standard(s):** 3.1

**Score Points:**

| | |
|---|---|
| **3 points** | Exemplary Response (three components) |
| **2** points | Two components<br>OR<br>Correct process; error in computation<br>AND<br>Both answers based on correct process |
| 1 point | One component |
| 0 points | Other |

**Scoring Comments:**

To earn 1 point for correct process, student only needs to show that $100 \div 7\frac{1}{2} \approx 13.3$ or $98\frac{1}{2} \div 7\frac{1}{2} \approx 13.13$ or $1200 \div 90 \approx 13.3$.

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# SESSION 2

**Session:** 2
**Item:** 1
**Page:** 12-13
**Content Standard(s):** 4 Patterns and Relationships
**Process Standard(s):** 4.1

**Score Points:**

**4** points

The student's response fully addresses the performance event.

The response:

- demonstrates knowledge of the mathematical concepts and principles needed to complete the event.
- communicates all process components that lead to an appropriate and systematic solution.
- may have only minor flaws with no effect on the reasonableness of the solution.

**3** points

The student's response substantially addresses the performance event.

The response:

- demonstrates knowledge of the mathematical concepts and principles needed to complete the event.
- communicates most process components that lead to an appropriate and systematic solution.
- may have only minor flaws with minimal effect on the reasonableness of the solution.

**2** points

The student's response partially addresses the performance event.

The response:

- demonstrates a limited knowledge of the mathematical concepts and principles needed to complete the event.
- communicates some process components that lead to an appropriate and systematic solution.
- may have flaws or extraneous information that indicates some lack of understanding or confusion.

**Session:** 2
**Item:** 1
**Page:** 12-13
**Content Standard(s):** **4** Patterns and Relationships
**Process Standard(s):** **4.1**

1 point — The student's response minimally addresses the performance event.

The response:

- demonstrates a limited knowledge of the mathematical concepts and principles needed to complete the event.
- communicates few or no process components that lead to an appropriate and systematic solution.
- may have flaws or extraneous information that indicates lack of understanding or confusion.

0 points — Other-Responses not addressed by the Condition Codes:

Examples of "0":

Work consists of copying the prompt information only.
Work indicates no mathematical understanding of the task.

**Session:** 2
**Item:** 1
**Page:** 12-13
**Content Standard(s):** 4 Patterns and Relationships
**Process Standard(s):** 4.1

**Sample Solution 1**

| Length of Phone Call | National Telex | Dial-Direct, Inc. |
|---|---|---|
| 1 | $0.35 | $0.21 |
| 2 | $0.47 | $0.35 |
| 3 | $0.59 | $0.49 |
| 4 | $0.71 | $0.63 |
| 5 | $0.83 | $0.77 |
| 6 | $0.95 | $0.91 |
| 7 | $1.07 | $1.05 |
| 8 | $1.19 | $1.19 |
| 9 | $1.31 | $1.33 |
| 10 | $1.43 | $1.47 |

Recommendation:

Any explanation equivalent to the following, indicating the length of calls when each company is least expensive and when they are equal:

National Telex would have the lower cost when the length of a phone call is greater than 8 minutes. Dial-Direct, Inc. would have the lower cost when the length of a call is less than 8 minutes. If the call is 8 minutes, then the cost of the two companies is equal. Since most of our calls are at least 10 minutes, I would recommend that you choose National Telex.

**Session:** **2**
**Item:** 1
**Page:** **12-13**
**Content Standard(s):** **4** Patterns and Relationships
**Process Standard(s):** **4.1**

**Sample Solution 2**

$x$ = number of minutes after the first minute $n$ = number of minutes

National Telex: $35 + 12x$ = cost (in cents) or $35 + 12(n - 1)$ = cost (in cents)

Dial-Direct, Inc.: $21 + 14x$ = cost (in cents) or $21 + 14(n - 1)$ = cost (in cents)

$35 + 12x = 21 + 14x$
$14 = 2x$
$x$ = 7 + first minute = 8 (minutes)

$35 + 12(n - 1) = 21 + 14(n - 1)$
$14 = 2(n - 1) = 2n - 2$
$2n = 16$
$n = 8$ (minutes)

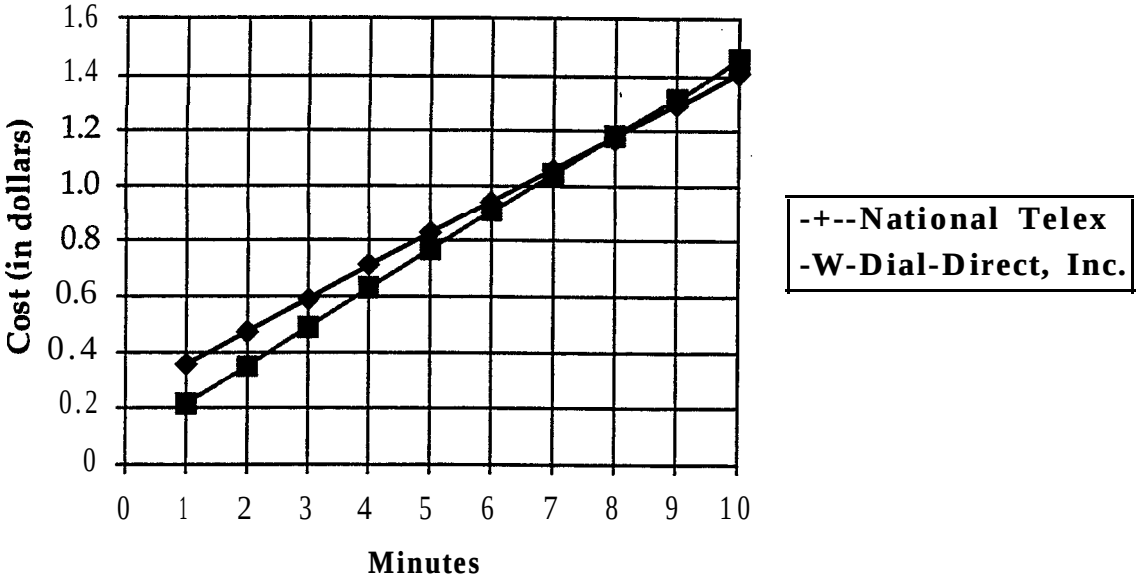
Recommendation:

Same as in Sample Solution 1

**Session:** **2**
**Item:** 1
**Page:** 12-13
**Content Standard(s):** **4** Patterns and Relationships
**Process Standard(s):** **4.1**

**Sample Solution** 3

**COST COMPARISON**




Note: Accept any answer that reasonably corresponds with the graph.

Recommendation:

Same as in Sample Solution 1

**Session:** 2
**Item:** 8
**Page:** 20
**Content Standard(s):** 2 Geometric/Spatial Sense and Measurement
**Process Standard(s):** 1.10

**Exemplary Response:**

- 13,188 (miles) if 3.14 is used for $\pi$

  OR

  approximately 13,195 (miles) if $\pi$ is extended

  OR

  $4200\pi$ (miles)

AND

- **2 x 3.14 x 2100**

  OR

  Other valid process

**Score Points:**

| | |
|---|---|
| **2** points | Exemplary Response |
| 1 point | Correct process; error in computation<br>OR<br>Correct answer |
| 0 points | Other |

**Scoring Comments:**

Some students extend $\pi$ from 3.14 to 3.1415927 (probably the $\pi$ key on their calculator). Answer using extended $\pi$ is 13,194.69 or 13,195.

Truncating or rounding of answer is allowed.

**Session:** 2
**Item:** 9
**Page:** 21
**Content Standard(s):** 2 Geometric/Spatial Sense and Measurement
**Process Standard(s):** 3.7

**Exemplary Response:**

- 60,000,000 or 60,288,000 (square miles)
  OR
  60,318,579 (square miles) if $\pi$ is extended
  OR
  19,200,000$\pi$ (square miles)
  OR
  Equivalent appropriate answer

AND

- **100% − 70% = 30%**
  **0.30(4 x 3.14 x 40002) =**
  0.30(200,960,000)
  OR
  Other valid process

**Score Points:**

| | |
|---|---|
| **2** points | Exemplary Response |
| 1 point | Correct process; error in computation<br>OR<br>Correct answer |
| 0 points | Other |

**Scoring Comments:**

Truncating or rounding is acceptable when students use the $\pi$ key (on a calculator).

**Session:** 2
**Item:** 10
**Page:** 21
**Content Standard(s):** 1 Number Sense
**Process Standard(s):** 3.7

**Exemplary Response:**

- $3.72 \times 10^7$ or $3.7 \times 10^7$ (miles)

AND

- 6 min. 40 sec. = 400 sec.
  $400 \div 2 = 200$ sec.
  $186{,}000 \times 200 = 37{,}200{,}000$

  OR

  Other valid process

**Score Points:**

| | |
|---|---|
| 3 points | Exemplary Response |
| 2 points | Correct process; error in computation<br>AND<br>Answer correctly expressed in scientific notation<br><br>OR<br><br>Correct process<br>AND<br>Correct answer not expressed in scientific notation<br><br>OR<br><br>Correct process<br>AND<br>Correct answer not expressed in correct scientific notation |

**Session:** 2
**Item:** 10
**Page:** 21
**Content Standard(s):** 1 Number Sense
**Process Standard(s):** 3.7

| | |
|---|---|
| 1 point | Correct answer expressed in scientific notation<br><br>OR<br><br>Correct answer not expressed in scientific notation<br><br>OR<br><br>Correct process without arriving at an answer<br><br>OR<br><br>Incorrect or no process but final decimal answer correctly expressed in scientific notation |
| 0 points | Other |

**Scoring Comments:**

Many students **doing** everything correctly EXCEPT dividing by 2 to make distance one **way.** This is an error in process, not in computation.